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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,141	03/31/2004	Peter-Pike Johannes Sloan	MSFT-2901/306874.02	9186

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EXAMINER	
NGUYEN, PHU K	
ART UNIT	**PAPER NUMBER**
2628	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/815,141	SLOAN ET AL.	
	Examiner	Art Unit	
	Phu K. Nguyen	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

PHU K. NGUYEN
PRIMARY EXAMINER
GROUP 2300

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/9/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 28-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 28, "said computer readable instructions" (line 3) has no antecedent basis since Applicant has not defined any means of "computer-readable instructions."

The remaning claims are rejected since they are dependent upon the rejected claims.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-2, 10-11, 19-20, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over SLOAN et al. (PRT for Realtime Rendering in Dynamic, Low frquency lighting Environments) in view of Baum et al.

As per claim 1, Sloan teaches the claimed "method for enhancing a Precomputed Radiance Transfer (PRT) mesh comprising a tessellation of triangles, said triangles comprising vertices and edges" (Sloan, page 531, column 1, section 5: Precomputing Radiance Self-Transfer). It is noted that Sloan teaches "subdivision of triangles" in this section but does not teach "dividing at least one triangle in the mesh, but not all

triangles in the mesh, into at least two or more triangles apiece." Baum teaches the subdivision of triangles is only applied to certain triangles satisfied some conditions, but not all triangles in the mesh (Baum, page 56, subdivision; under the balancing conditions, only a selected elements are subdivided). It would have been obvious in view of Baum to configure Sloan's subdivision as claimed because the subdivision of the triangles is only applied to a triangle which is not satisfied the mesh condition, to reduce the processing time in compare with the case of subdivision all the triangles.

Claim 2 adds into claim 1 "said dividing at least one triangle comprises dividing at least one edge and creating at least one new vertex and at least one new edge running from said vertex for said triangle" which Baum teaches in figure 9.

As per claim 10, Sloan teaches the claimed "system for enhancing a Precomputed Radiance Transfer (PRT) mesh comprising a tessellation of triangles, said triangles comprising vertices and edges" (Sloan, page 531, column 1, section 5: Precomputing Radiance Self-Transfer). It is noted that Sloan teaches "subdivision of triangles" in this section but does not teach "a subsystem for dividing at least one triangle in the mesh, but not all triangles in the mesh, into at least two or more triangles apiece." Baum teaches the subdivision of triangles is only applied to certain triangles satisfied some conditions, but not all triangles in the mesh (Baum, page 56, subdivision; under the balancing conditions, only a selected elements are subdivided). It would have

been obvious in view of Baum to configure Sloan's subdivision as claimed because the subdivision of the triangles is only applied to a triangle which is not satisfied the mesh condition, to reduce the processing time in compare with the case of subdivision all the triangles.

Claim 11 adds into claim 10 "said subsystem for dividing at least one triangle in the mesh comprises a subsystem for dividing at least one edge and creating at least one new vertex and at least one new edge running from said vertex" which Baum teaches in figure 9.

As per claim 19, Sloan teaches the claimed "computer-readable medium comprising computer-readable instructions for enhancing a Precomputed Radiance Transfer (PRT) mesh comprising a tessellation of triangles, said triangles comprising vertices and edges" (Sloan, page 531, column 1, section 5: Precomputing Radiance Self-Transfer). It is noted that Sloan teaches "subdivision of triangles" in this section but does not teach "instructions for dividing at least one triangle in the mesh, but not all triangles in the mesh, into at least two or more triangles apiece." Baum teaches the subdivision of triangles is only applied to certain triangles satisfied some conditions, but not all triangles in the mesh (Baum, page 56, subdivision; under the balancing conditions, only a selected elements are subdivided). It would have been obvious in view of Baum to configure Sloan's subdivision as claimed because the subdivision of

the triangles is only applied to a triangle which is not satisfied the mesh condition, to reduce the processing time in compare with the case of subdivision all the triangles.

Claim 20 adds into claim 21 "said instructions for dividing at least one triangle in the mesh comprise instructions for dividing at least one edge and creating at least one new vertex and at least one new edge running from said vertex for a triangle" which Baum teaches in figure 9.

As per claim 28, Sloan teaches the claimed "hardware control device comprising means for enhancing a Precomputed Radiance Transfer (PRT) mesh comprising a tessellation of triangles, said triangles comprising vertices and edges" (Sloan, page 531, column 1, section 5: Precomputing Radiance Self-Transfer). It is noted that Sloan teaches "subdivision of triangles" in this section but does not teach "said computer-readable instructions comprising instructions for dividing at least one triangle in the mesh, but not all triangles in the mesh, into at least two or more triangles apiece by dividing at least one edge and creating at least one new vertex and at least one new edge running from said vertex." Baum teaches the subdivision of triangles is only applied to certain triangles satisfied some conditions, but not all triangles in the mesh (Baum, page 56, subdivision; under the balancing conditions, only a selected elements are subdivided). It would have been obvious in view of Baum to configure Sloan's subdivision as claimed because the subdivision of the triangles is only applied to a

triangle which is not satisfied the mesh condition, to reduce the processing time in compare with the case of subdivision all the triangles.

Claims 3-9, 13-18, 21-27, and 29-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The allowable features in claim 3 and its dependent claims 4-7 are "sampling a PRT vector at each vertex and each midpoint of each edge, and computing an error at each midpoint at each edge based on the PRT vector for each said midpoint and the PRT vectors for each vertex corresponding to each said edge; and for each edge having an error at its midpoint that is greater than a predetermined error tolerance value (a "marked edge"), dividing the triangle for that edge into at least two new triangles as follows: dividing the marked edge into two new edges with a new vertex at the midpoint for said edge (each a "divided edge"); and creating a new edge between said new vertex and a vertex not on said edge, such that said edge is common to said two new triangles (each a "common edge")."

The allowable features in claim 8 and its dependent claim 9 are "sampling a PRT vector at each vertex and each midpoint of each edge, and computing an error at each midpoint at each edge based on the PRT vector for each said midpoint and the PRT vectors for each vertex corresponding to each said edge; and for each triangle comprising at least one edge having an error at its midpoint that is greater than a

predetermined error tolerance value (a "marked edge"), dividing said triangle into four new triangles as follows: dividing each edge of said triangle into two new edges with a new vertex at the midpoint for said such edge (each a "divided edge"); and creating new edges between each pair of new vertices (each a "common edge")."

The allowable features in claim 12 and its dependent claims 13-16 are "a subsystem for sampling a PRT vector at each vertex and each midpoint of each edge; a subsystem for computing an error at each midpoint at each edge based on the PRT vector for each said midpoint and the PRT vectors for each vertex corresponding to each said edge; and a subsystem for dividing a marked edge, that is, an edge having an error at its midpoint that is greater than a predetermined error tolerance value, into two new edges with a new vertex at the midpoint for said edge (each a "divided edge"); and a subsystem for creating a new edge between said new vertex and a vertex not on said edge, such that said edge is common to said two new triangles (each a "common edge").

The allowable features in claim 17 and its dependent claim 18 is "; a subsystem for computing an error at each midpoint at each edge based on the PRT vector for each said midpoint and the PRT vectors for each vertex corresponding to each said edge; and a subsystem for dividing each triangle comprising at least one edge having an error at its midpoint that is greater than a predetermined error tolerance value into four new

triangles as follows: dividing each edge into two new edges with a new vertex at the midpoint for said such edge (each a "divided edge"); and creating new edges between each pairs of new vertices (each a "common edge")."

The allowable features in claim 21 and its dependent claims 22-25 are "instructions for: sampling a PRT vector at each vertex and each midpoint of each edge, and computing an error at each midpoint at each edge based on the PRT vector for each said midpoint and the PRT vectors for each vertex corresponding to each said edge; and for each edge having an error at its midpoint that is greater than a predetermined error tolerance value (a "marked edge"), dividing the triangle for that edge into at least two new triangles as follows: dividing the marked edge into two new edges with a new vertex at the midpoint for said edge (each a "divided edge"); and creating a new edge between said new vertex and a vertex not on said edge, such that said edge is common to said two new triangles (each a "common edge"). "

The allowable features in claim 26 and its dependent claim 27 are "instructions for: sampling a PRT vector at each vertex and each midpoint of each edge, and computing an error at each midpoint at each edge based on the PRT vector for each said midpoint and the PRT vectors for each vertex corresponding to each said edge; and for each triangle comprising at least one edge having an error at its midpoint that is greater than a predetermined error tolerance value (a "marked edge"), dividing said triangle into four new triangles as follows: dividing each edge of said triangle into two new edges with a

new vertex at the midpoint for said such edge (each a "divided edge"); and creating new edges between each pair of new vertices (each a "common edge"). "

The allowable features in claim 29 and its dependent claim 30 are "sampling a PRT vector at each vertex and each midpoint of each edge, and computing an error at each midpoint at each edge based on the PRT vector for each said midpoint and the PRT vectors for each vertex corresponding to each said edge; and for each edge having an error at its midpoint that is greater than a predetermined error tolerance value (a "marked edge"), dividing the triangle for that edge into at least two new triangles as follows: dividing the marked edge into two new edges with a new vertex at the midpoint for said edge (each a "divided edge"); and creating a new edge between said new vertex and a vertex not on said edge, such that said edge is common to said two new triangles (each a "common edge")."

The allowable features in claim 31 and its dependent claim 32 are "sampling a PRT vector at each vertex and each midpoint of each edge, and computing an error at each midpoint at each edge based on the PRT vector for each said midpoint and the PRT vectors for each vertex corresponding to each said edge; and for each triangle comprising at least one edge having an error at its midpoint that is greater than a predetermined error tolerance value (a "marked edge"), dividing said triangle into four new triangles as follows: dividing each edge of said triangle into two new edges with a

new vertex at the midpoint for said such edge (each a "divided edge"); and creating new edges between each pair of new vertices (each a "common edge"). "

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phu K. Nguyen whose telephone number is (571) 272 7645. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Razavi can be reached on (571) 272 7664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Phu K. Nguyen
June 21, 2007

PHU K. NGUYEN
PRIMARY EXAMINER
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